



B97 Detection of Pyrolytic Products of Amphetamine and Methamphetamine by Differential Scanning Calorimetry

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The goal of this presentation is to develop a method for characterizing thermal degradation products of smoked drugs of abuse.

Differential scanning calorimetry (DSC) is a thermal analytical technique used to characterize changes in the state of a material. Because DSC operates under tight temperature controls, the authors applied this technique to studies on the thermal decomposition of drugs. A number of physical and chemical changes can occur in a material as its temperature is increased, and methods for characterizing these alterations upon heating or cooling a sample of the material is referred to as thermal analysis. In this technique, sample and reference material are maintained isothermally to each other by proper application of electrical energy as they are heated or cooled at a linear rate. The difference in energy input required to maintain the sample and the reference at exactly the same temperature is plotted as a function of the sample temperature.

Sample sizes of 0.6-1.0 mg of amphetamine sulfate and methamphetamine hydrochloride were analyzed using a Perkin Elmer Differential Scanning Calorimeter 7 (DSC7). The sample was placed into an aluminum sample pan. The pan and sample were covered with a lid that was crimped so that the sample was encapsulated in an airtight container. The pan with the sample was placed in the sample holder, while an empty reference pan with a cover was placed on the reference side. The analysis was begun after dry nitrogen was passed through the instrument for 10 min. Scanning rates of 20^o and 40^oC/min were evaluated in the temperature range of 25^o to 500^oC. Samples were eluted with 100 μ L of ethanol and 5 μ L portions were injected onto a C-18 reverse phase HPLC column with 90:10 MeOH:H₂O mobile phase at a flow rate of 1 mL/min. Samples were also analyzed by GC-MS on a DB5 capillary column with oven temperature 50^oC held for 1 min then programmed at 15^oC /min to 280^oC.

Both amphetamine and methamphetamine degraded when heated in the DSC instrument. At least 5 decomposition products were observed by HPLC and GC-MS analysis.

DSC can be used to study the thermal instability of amphetamine and methamphetamine in a sealed, temperature-controlled environment. The profile of degradation products formed can be compared to the products formed by other pyrolytic methods.

Amphetamines, DSC, Pyrolysis